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ABSTRACT

An observational recording system was devised to record and to replay the stream of classroom events--nonverbal events, as well as verbal. Although videotape recording/closed circuit television has been used in similar systems, the one here used selected 35mm. stills made from 16mm. film. The stills were then synchronized with tape recordings and projected by a Carousel projector. In addition to its use as a research tool, replay of edited material to teachers or student teachers may be used to illustrate a point in a lecture or seminar. It may also be used to enable teachers to make their own observations. It is hoped that a library of recorded incidents will be built up, perhaps associated with case study material. (MF)

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TIME-LAPSE PHOTOGRAPHY IN RECORDING CLASSROOM EVENTS.

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The classroom interaction of teachers and taught is a complex affair and research projects that have attempted to use observational methods to describe the stream of classroom events have only partially succeeded in coming to terms with this complexity. Most of the early research was limited by the moral judgements implicit in its concepts, either in the form of rating methods, or in the theoretical ideas used to interpret behaviour. In the mid-nineteen-fifties, however, the educational research tradition of classroom observation finally overcame the value-judgements involved in rating studies with the work of Donald Medley and Harold Mitzel, and the instrument they called "OScAR".*1 A few years later Ned Flanders developed a method of interaction analysis which allowed the psychological study of classroom events without total domination by the moral-political values implicit in the idea of the "authoritarian personality".*2

Although the researches of Medley and Mitzel and Flanders mark considerable achievements in the field of classroom research they suffer a number of inadequacies. First of all, they largely ignore both implicit and explicit lesson content; second, they operate on short time-samples and are only of limited value in an intensive analysis of a small number of classrooms over a period of time; third, (and this is less true of OScAR), they have built-in to their assumptions a style of teaching that is limited to "whole class teaching", and they are not so useful in analysing small-group teaching, or the "open classroom".

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*1 See, for example, Medley (1963); Medley and Mitzel, (1963).

*2 Flanders, (1965), (1970).

Recently researchers have begun to realise that the models of the educational process that are implicit in most observational instruments are only applicable to certain classroom settings. Not only are classroom events more complex than the observational instruments let them seem, but there are situations in which the instruments are quite unusable. This is perhaps particularly true of the kind of situations an observer is likely to meet in some British Primary Schools, or American "Free" Schools. In these situations researchers have tended to turn to using video-taped cctv as a means of collecting information. This allows you to record in most situations and also frees you from the problem of having to decide how much to pre-categorise your observations in the interests of reliability and observer agreement.

The major problem facing classroom observational research at present is that of generating theories with which to approach the material gathered by vtr/cctv in a way that allows variable sensitivity to the many different aspects of reality captured by the equipment. In other words, sometimes we want to look at content rather than context; sometimes we want to look at all the children, othertimes at a group, or one child, or the teacher; sometimes we want to listen to what is said, sometimes we want to watch what people are doing. We may want to look at one class for a day, or ten classes for a week, or one class for a year. According to the way we make all these decisions we will realise different aspects of reality - for example, a short time-scale will take us close up to the surface realities of the classroom and will lead to a mainly behavioural analysis of classroom events in which similar bits of behaviour are thought of as identical and so analysed atomistically. A slightly longer time scale will lead us to seeing classroom events in terms of sequences and strategies, and the longer the time sample is the

more we will tend to be drawn into looking at the educational aims and objectives of the teacher and the organisational life of the school.

Most of the earlier observational research (Flanders, B.O. Smith, Medley and Mitzel, Withall, for example) used relatively short time samples; perhaps half an hour at a time, and a form of analysis that was largely atomistic in its concepts. Many of the recent studies using video-taped cctv have used longer time-samples, typically a whole day, and their resulting picture of classroom events is of a more phenomenological character. For example, the studies of classroom discipline made in Detroit by Jacob Kounin conceptualise classroom events in terms of the quality of teachers' techniques for classroom management during changes between episodes in the stream of classroom events.*1

Recently we have realised that an even longer time-scale for observations allows us to realise yet another level of structure in classroom events.*2 The researches of Louis Smith, in particular, have shown that if you observe for a period of several weeks or months in one classroom you come aware of the classroom interaction of teachers and children as part of an on-going process in which there is continuous change.

The same event in the classroom may therefore be seen in a variety of different ways according to the frame of reference of the observer. It may be related to events categorised as identical by the observer in the same, or other classes, and then compared as a frequency with other events in other categories. It may be seen as part of an episode in the interaction of teacher and taught, and then compared with other

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*1 Kounin, (1970)

*2 Smith and Geoffrey (1968), Smith and Keith (1971), Smith (1970)

episodes. It may be seen as a unique event in the life histories. If we interested in the event itself rather than a particular form of interpretation each aspect is equally valid and important, and in considering a teaching problem we should be able to call on any one of them.

The Research Problem.

One of us, Rob Walker, has recently been working as a participant observer in two secondary school classrooms over a period of about eighteen months. One of the problems that arose in this research was that it was often difficult to know what was being communicated between different groups in the classroom. This was particularly true in one class because all the children in the room would be working on different tasks while the teacher moved around discussing things with different individuals or groups of children. It was difficult to know what was being communicated between the teacher and the children without intruding on their relationship.

This problem was partially overcome by getting the teacher to wear a wireless microphone, the receiver of which was connected to a tape recorder. This allowed the researcher to replay tapes and reconstruct events in his mind's eye but there were certain disadvantages - it was often hard to tell how many children the teacher was working with, and how these children interacted amongst each other. Often what seemed from the tapes to be a continuous verbal interaction was interrupted by considerable non-verbal activity, and perhaps movement right across the room. It was also apparent that the teacher relied heavily on non-verbal signals for controlling behaviour outside the group of verbal interaction.

What was needed was an observational recording system with the potential of vtr/cctv which would allow us to see the context within which particular verbal interactions occurred, but the use of such equipment on the time-scale of this research was not feasible, it would have been an enormous task. We did not want a complete record of everything that occurred, but rather a visual record to which we could refer in analysing selected events over long periods of time. We were interested in the long-term development of classroom social structures, norms and values, not in the detailed analysis of behaviour.

The idea of using time-lapse photographic recordings came from an early paper of John Withall's (Withall, 1956) in which he used 35mm photographs taken at 15 second intervals to record patterns of classroom activity. We have since learnt that Paul Gump (Gump, 1967) has used a technique more similar to the one described here but in a rather different kind of study. In both cases film was used as a means of getting black and white prints at fairly long time intervals, and not in the way we describe here.

The Technique used for recording classroom events.

We needed a method that would be unobtrusive, simple to operate, relatively inexpensive in recording and playback and above all, would record much of the ongoing events at regular short intervals. We considered several possibilities; 35mm still photography, super-8 movie and 16mm movie photography and vtr/cctv.

35mm still photography has several disadvantages. The normal camera is limited to 36 frames which is not enough to cover a 1 to 2 hour session. We could neither hire nor borrow a 250 frame cassette, nor did we have a turret change or zoom lens.

Super-8 has some advantages, notably the small size of the equipment, but we found it unsuitable because of the restricted range of available film stock and the poor quality of copies. The equipment is also almost as expensive as 16mm equipment.

16mm photography has considerable advantages over other techniques: 100 feet of 16mm film contains about 4000 single frames, and so even at a rate of one frame a second it lasts for 65 minutes of recording. In addition the 16mm camera is relatively small, has a variety of lenses, its own electric motor drive, it gives a high quality image and is easily hired. There is as large a selection of black and white and colour film stock for this gauge as there is for 35mm.

Electronic time lapse equipment for this camera is however quite expensive (in England abcut £200)*1 and we were unable to hire it. As a substitute we used a high torque electric motor of suitable r.p.m. to depress a remote air pressure driven release calbe (Kagra) to give the time-lapse interval required.*2

A trial attempt at recording in the classroom at one frame every four seconds did not record sufficient information. Within four second intervals important transitions in social setting can take place so as to leave gaps in the filmed record.

The camera, a Beaulieu, was powered by batteries which, because the power had to be on continuously, ran down after about 15 minutes. In addition, the motor took a fraction of a second to reach the required

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*1 "Robot Controls" make a camera with built-in time-lapse motor for £400

*2 This device was made for us by Gerry Hughes, senior technician at Chelsea College.

speed and this meant that the shutter was open for a longer interval than that indicated on the scale. In some sequences the net result was over-exposure, resulting in loss of definition (one could calibrate to compensate). The improvised time-lapse equipment performed adequately but there was a tendency for the bulb to creep from under the rotating arm of the motor (solved by forming a plasticene mould within a wooden box underneath the bulb), and eventually for the bulb to lose its elasticity.

These problems were overcome in a second attempt - the time lapse motor had another drive arm attached to the crankshaft so as to depress the bulb once every two seconds. We used a clockwork motor Bolex camera, which we found gave less resistence to the remote control release cable, and the shutter speed was as indicated. However, clockwork needs winding and we had to rewind the motor within the two-second interval between frames about every fifteen minutes.

All the film was exposed by available daylight (winter), occasionally adding the lights of the classroom. Kodak 4-X negative film was fast enough to allow us to shoot at about 1/60th of a second with an aperture of between 2.8 and 5.6. We used a 10mm lens initially, then, with increasing confidence, we sometimes followed the teacher with the telephoto.

Simultaneous with the film recording a real time sound recording was made. The teacher wore an AKG D 109 lavalier microphone connected to a Lustraphone radio transmitter. The receiver was connected to a tape recorder. This left the teacher free to move around the room and did not seem to inhibit her in any way. At the end of a week of

continuous recording she did say that it had become something of a strain; although she forgot about it whilst in the classroom she felt rather strange out of school when she realised that she was no longer wearing it! The microphone was selected for its small size, lightweight and ability to record the teacher prominently, whilst accentuating questions and answers - assuming their greater volume. In earlier recordings we had some trouble with an old radio microphone of a narrow bandwidth and standard microphone. This equipment tended to pick up too much background noise and to distort the teacher's voice.

Replaying the visual and sound recordings.

For research purposes the recordings can be used in a number of ways - the film can be viewed on a moviola, run at single frame of silent speed on a normal projector, or replayed at "real" speed, with synchronised sound on specialised type of projector (a "motion analyser"). One of our objects however was to use bits of film in presentation to student teachers and teachers on in-service courses.

We selected interesting, and interrelated parts of the film recording and sent them for enlargement to 35mm. Individual frames were then mounted in numbered half-frame mounts and projected from a Carousel projector and the projected images synchronised with the sound recording.

It seemed easy in theory. Set up the tape recorder, synchroniser and projector, press the button at the start of the visual sequence and every two seconds after. However, the system took about one second to respond. Thus the duration of the projected image was barely one second. We did think of a system of two projectors but the linking dissolve unit was too expensive to buy. Eventually, by inserting a signal generator

we obtained a rapid enough response. In any case it soon appeared that not all the images were necessary. In fact, by reducing the number of images to about half, action and interaction became easier to observe. Like a film it seemed that to remove certain "redundant" images gave a clearer impression of both the sound and visual connections. (We are interested in the possible significance of the redundant images). Thus the initial fixed frequency, which was arbitrarily imposed on the reality, becomes a photo play in which the images change at the right perceptual moment.

Why take so many photos if only half the number is needed? To successfully photograph the relevant images successively would take even more than the eye and ear of a Cartier-Bresson. The strain on the photographer would exhaust him in five minutes. Anyhow, we can only begin to find significance in unusual events after they have occurred. We cannot even intuitively judge what is the right image all of the time. We finished with nearly 4 days of continuous recording in the same classroom. From this we selected two short (4 minute) and one long (15 minute) sequences.

Further ideas, Problems and some solutions.

In addition to its use as a research tool, replay of edited material to teachers or student teachers could be used to illustrate a point in a lecture or seminar, or enable teachers to make their own observations, raise questions and possible answers. If it is to be used widely the replay facility has to be as simple as possible.

The rotary tray projector takes 80 slides, so a very long sequence would necessitate stopping and changing trays - this could be indicated on the tape.

In recording the ideal system would be one using two 16mm cameras, one with a fixed wide angle lens, the other with a zoom lens, and both activated by the same electronic time lapse system. Ideally both cameras would have automatic exposure and focussing systems and operate on movable remote control tripods. A system could be devised so that the teacher, or even one of the children, would carry a device which emanated high frequency pulses which would act as a target for the camera lenses. We estimate that such a system would cost about £1200 using hired cameras. Such a system could be operated by the teacher alone, including sychronised sound recording, or could be operated by an observer who could leave the classroom during recording. It should be noted however that in our own observations we have found that long-term observation of the class both prior to recording, and during recording, is invaluable in the interpretation and editing of the selected sequences.

This recording system may sound elaborate, but an equivalent system using cctv would require 3 operators, and to get a good recording would need heavy equipment and cables and two video-tape recorders. If conventional camera/man/director methods were used, a TV programme would be produced, and one of our reasons for developing this technique was an uneasy feeling that such records of classroom events give only a partial view of classroom realities. The main advantage of video-taped cctv seems to be the exact synchronisation of sound and image, and their record on the same tape, and the facility for instant replay.

Recently Akai have introduced a miniturised, one-man cctv system at a cost of around £500. Although it is extremely portable, and cheap to use (it operates on ¼" tape) it has a maximum recording time of only

20 minutes. Another possible means of replay is the "La Belle Courier" 16mm tape-film system (£125), and the synchro-analyser tape recorder system.

Summary.

We feel that this use of film is a valuable research tool for classroom observers who want to follow classroom events over fairly long periods of time but with some access to records at quite a detailed level of behaviour.

In teacher education we feel that the technique can be used to give some insight into the synamics of classroom events and educational processes. In time we hope to build up a library of recorded incidents, perhaps associated with case study material, such as teachers' own records and interpretations of events, and information about the school situation. This kind of material might be used in the same way that business case studies are used in management training.

The picture of classroom events that begins to emerge from what we have written may seem unnecessarily complex. Certainly there are tidier ways of analysing and describing classroom interaction (for example Flanders method of interaction analysis). However, our feeling is that a multi-faceted interpretation of individual classroom events is needed in both research and teacher education. Any single incident has several meanings according to the interpretive framework of the observer. We feel that research into classroom events should aim to describe these different levels of meaning and explore their functions in the ongoing life of the teacher, the class and the school. In teacher education we want to give students some idea of the effects of their actions on the complexities of classroom structures.

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Costing.

16mm movie camera. To buy £400- £1000

To hire £10 per week.

100 ft. 4-X black and white movie film with processing. £3.5.

Enlargements to 35mm from 16mm black and white - about 20p. per ft. of 35mm.

Tripod. To buy £40

To hire £5 per week.

Electric motor. £10

Bearings. £3

Cable release. £3

Lustraphone radio transmitter and receiver. £120

AKG D.109 microphone. £12

Tape recorder for synchronisation. £120- £400

35mm still photography:

Pentax system. (Spotmatic, f 1.4 lens, battery-run motor wind) costs £530. This takes 2-3 frames per second at 1/1000 sec.

250-exposure cassettes are available.

100 ft. of 35mm black and white film, incl, processing costs about £6

35mm still cameras can be hired for around £10